

AUTO-REVERSIBLE TOILET SEAT MOUNTING STRUCTURE

BACKGROUND OF THE INVENTION

1. Field of the invention

The present invention relates to a toilet seat and, more specifically, to
5 an auto-reversible toilet seat mounting structure, which automatically smoothly
lifts the toilet seat after each use of the toilet by a user.

2. Description of the Related Art

FIGS. 1A and 1B show a coupling device for use in an auto-reversible
toilet seat mounting structure to pivotally fasten a toilet seat to a bracket at the rear
10 side of a toilet bowl for enabling the toilet seat to be automatically returned to the
vertical position after each use of the toilet by a user. The coupling device **10** is a
hollow member having a front chamber **14**, a rear chamber **16**, a bottom
chamber **18**, a narrow passage **24** in fluid communication between the front
chamber **14** and the rear chamber **16**, a guide tube **22** connected between the
15 rear chamber **16** and the bottom chamber **18**, a throttle gate **24** set between the
front chamber **14** and the bottom chamber **18**, a counterweight block **22**
disposed at the rear side to compensate the weight of the toilet seat. When in
use, a fluid is filled in the coupling device **10**. After each use of the toilet by a
user, the fluid flows from the front side in each coupling device to the rear side,
20 thereby causing the respective coupling device to lift the toilet seat. This
structure of auto-reversible toilet seat mounting structure is not practical for use
in the Frigid Zone because the fluid freezes when cold. Further, the coupling
device tends to be damaged, causing the fluid to leak out and to contaminate

the surroundings.

Therefore, it is desirable to provide an auto-reversible toilet seat mounting structure that eliminates the aforesaid drawbacks.

SUMMARY OF THE INVENTION

5 The present invention has been accomplished under the circumstances in view. It is therefore the main object of the present invention to provide an auto-reversible toilet seat mounting structure, which is free from the limitation of working temperature. It is another object of the present invention to provide an auto-reversible toilet seat mounting structure, which does not produce
10 pollutant. It is still another object of the present invention to provide an auto-reversible toilet seat mounting structure, which has a compact size and nice outer looking.

To achieve these and other objects of the present invention, the auto-reversible toilet seat mounting structure comprises a toilet seat, the toilet
15 seat having pairs of plug holes disposed at a rear side thereof; and at least one pair of coupling devices selectively plugged into the pairs of plug holes and fastened pivotally with a bracket at the back side of a toilet bowl for enabling the toilet seat to be turned relative to the toilet bowl between a vertical position and a horizontal position and automatically returned to the vertical position
20 after the toilet seat having been moved to the horizontal position and than released from pressure. Each coupling device comprises an inside holding space, a longitudinal partition wall longitudinally suspended in the inside holding space and obliquely downwardly extended from a rear side toward a

front side and separating the inside holding space into an upper chamber and a lower chamber, a plurality of solid spherical members put in the inside holding space and movable between the upper chamber and the lower chamber, the solid spherical members each having a predetermined weight, first passage
5 disposed at a rear side of the longitudinal partition wall between the upper chamber and the lower chamber, first door means pivoted to the first passage for enabling the steel balls to move from the lower chamber into the upper chamber and prohibiting the steel balls from passing through the first passage in direction from the upper chamber to the lower chamber, second passage
10 disposed at a front side of the longitudinal partition wall between the upper chamber and the lower chamber, second door means adapted to close the second passage, and spring means supporting the second door means in the close position to close the second passage and adapted to open the second door means for enabling the steel balls to move through the second passage in one
15 direct from the upper chamber to the lower chamber when compressed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A a sectional view of a coupling device for use in an auto-reversible toilet seat mounting structure according to the prior art.

FIG. 1B is a perspective view of the coupling device shown in FIG.
20 1A.

FIG. 2 is sectional view of a coupling device for use in an auto-reversible toilet seat mounting structure according to the present invention.

FIG. 3 is a schematic drawing showing the relationship between the toilet seat and the coupling devices according to the present invention.

FIG. 4A is a schematic drawing showing the coupling device turned from the vertical position to the horizontal position, the steel balls moved from the back side in the upper chamber to the front side in the upper chamber
5 the back side in the upper chamber to the front side in the upper chamber according to the present invention.

FIG. 4B is a schematic drawing showing the coupling device turned from the horizontal position to the vertical position, the steel balls circulated through the lower chamber.

10 FIG. 5 is a schematic drawing showing the operation of an alternate form of the coupling device according to the present invention.

FIG. 6 shows another application example of the present invention.

FIG. 7 is an elevational view of a toilet constructed according to the present invention, showing a micro switch installed at the bracket at the rear
15 side of the toilet bowl adjacent to the toilet seat.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 2, a hollow coupling device 30 is shown comprising a corrugated partition plate 44 obliquely transversely suspended near the rear side, a smooth partition plate 32 longitudinally forwardly extended from a middle part of the corrugated partition plate 44 and obliquely extended to the
20 front side, an upper chamber 34 and a lower chamber 36 separated by the smooth partition plate 32, a first swinging door 38 disposed at a rear side of the partition plate 32, a second swinging door 40 disposed at a front side of the

partition plate 32, a spring member 42 provided at the bottom side of the second swinging door 40 to keep the second swinging door 40 in the close position when receiving no pressure and to force the second swinging door 40 to open the passage between the upper chamber 34 and the lower chamber 36
5 when receiving a pressure, a plurality of steel balls 46 put on the inside and movable between the upper chamber 34 and the lower chamber 35, an adjacent screw 48 provided at the rear side behind the corrugated partition plate 44, and a weight 49 mounted on the adjustment screw 48. The adjustment screw 48 can be rotated to move the weight 49 forwards or backwards inside the
10 coupling device 30 and further adjust the center of gravity of the coupling device 30.

Referring to FIG. 3, the toilet set lid 50 has two first plug holes 52 bilaterally disposed at the rear side, and two second plug holes 54 bilaterally disposed at the rear side and respectively disposed adjacent to the first plug
15 holes 52 at an inner side. Two coupling devices 30 are selectively plugged into the first plug holes 52 or second plug holes 54 for pivotally fastening the toilet seat 50 to any of a variety of toilets (not shown). The first plug holes 52 may be respectively formed integral with the second plug holes 54.

Referring to FIGS. 4A and 4B and FIGS. 2 and 3 again, when the user
20 lowered the toilet seat 50 from the vertical position to the horizontal position to rest the toilet seat 50 on the toilet bowl (not shown), the steel balls 46 move along the closed first swinging door 38 and the top surface of the smooth partition plate 32 to the front side of each coupling device 30 and are gathered

at the front side of the upper chamber **34** above the second swinging door **40** (see FIG. 4A). At this time, the spring member **42** receives no pressure, and the second swinging door **40** is closed to stop the steel balls **46** from passing through. When the user sitting on the toilet seat **50**, the spring member **42** is
5 forced against the toilet seat (not shown) to push open the second swinging door **40**, for enabling the steel ball **46** to pass from the upper chamber **34** to the lower chamber **36** and then to be gathered at the bottom side of the corrugated partition plate **44** inside the lower chamber **36**. After leaving of the user from the toilet seat **50**, the respective steel balls **46** move along the obliquely
10 extended corrugated partition plate **44** toward the first swinging door **38** to give a biasing force to the respective coupling device **30** (because the steel balls **46** are gathered at the rear side of the respective coupling device **30**, which has a middle part fastened pivotally with a bracket at the back side of the toilet bowl and the toilet), thereby causing the respective coupling device **30** to be returned
15 from the horizontal position toward the former vertical position. At this time, the steel balls **46** push open the first swinging door **38** and move from the lower chamber **36** into the upper chamber **34**, and therefore the toilet seat **50** is returned to its former vertical position.

FIG. 5 shows an alternate form of the coupling device **30**. According
20 to this alternate form, a sliding eye plate **56** is used to substitute for the aforesaid second swinging door **40**. The sliding eye plate **56** defines a through hole (not shown) having a diameter greater than the steel balls **46**. When the spring member **42** receives no pressure, the sliding eye plate **56** is supported in

a first position where a part of the through hole is blocked, and the steel balls
46 are prohibited from passing through. When the user sitting on the toilet seat
lid to compress the spring member 42, the sliding eye plate 56 is moved from
the first position to a second position where the through hole is fully opened for
5 enabling the steel balls 46 to pass.

FIG. 6 shows another application example of the present invention. As
illustrated, the toilet seat 60 is fixedly fastened to a pivot shaft 62, and two
coupling devices 30 are symmetrically mounted on the pivot shaft 62 near two
ends. The pitch between the coupling devices 30 is adjustable to fit any of a
10 variety of toilets.

Referring to FIG. 7, the toilet seat 50 is pivoted to a bracket 66 at the
back side of the toilet bowl above a micro switch 64. When user using the toilet
and sitting on the toilet seat lid above the toilet seat 50, the toilet seat 50 is
disposed in contact with the micro switch 64. After leaving of the user from the
15 toilet seat lid, the toilet seat 50 is automatically lifted from the toilet bowl and
the micro switch 64, at this time the micro switch 64 gives a signal to start the
flushing system of the toilet and/or other electrically operated devices such as
ozone generator, ultraviolet sterilizer, air purifier, etc.

As indicated above, the present invention provides an auto-reversible
20 toilet seat mounting structure, which automatically smoothly lifts the toilet seat
at a low speed only after each use of the toilet by a user.

A prototype of auto-reversible toilet seat mounting
structure has been constructed with the features of FIGS. 2~7. The

auto-reversible toilet seat mounting structure functions smoothly to provide all of the features discussed earlier.

Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications and enhancements
5 may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.